Sensitivity analysis of climate change risk assessment

Study of parameters variation in hazard indicators

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Introduction

- Risk: potential for adverse consequences for human or ecological systems [...]
- Climate Change Risk Assessment (CCRA)

The problem

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- Sensitivity analysis of indicators within the hazard determinant

Case study

- Torino Airport

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- Hazard drivers: heat wave, heavy precipitation

Climate datasets

- Climatological baseline: ERA5
- Climate projections: NEX-GDDP-CMIP6

ERA5

- Organisation: European Centre for Medium-Range Weather Forecasts
- Data type: reanalysis
- Spatial resolution: 0.25° x 0.25°
- Time frequency: hour

NEX-GDDP-CMIP6

- Organisation: NASA Earth Exchange
- Data type: statistically downscaled bias-corrected climate projections
- Spatial resolution: 0.25° x 0.25°
- Time frequency: day
- Historical period 1950-2014, projection period 2015-2100
- Model: EC-Earth3
- Scenario: SSP1-2.6, SSP2-4.5, SSP5-8.5

Spatial frame

- Box of 3 x 3 grid points centred at the coordinates of the airport

Temporal frame

- Baseline period: 1994-2023
- Time horizons: 2021-2040, 2051-2070, 2081-2100

Methodology

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- Fix exposure and vulnerability from literature
- Evaluate risk

Preprocessing

1. Regrid ERA5

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2. Aggregate ERA5 at daily frequency

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3. Align NEX-GDDP-CMIP6 timestamps

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1. Regrid ERA5
2. Aggregate ERA5 at daily frequency
3. Align NEX-GDDP-CMIP6 timestamps
4. Bias adjustment

Evaluation of hazard indicators

1. Define intervals of parameters

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3. Temporal aggregation

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4. Risk evaluation

Next steps

- Uncertainty evaluation
- Evaluate risk with non-linear relations among hazard indicators and among determinants
- Extend analysis to Bologna's and Ciampino's airports